

(3) *Evacuation.* If used as an alternative, effective evacuation shall be demonstrated by actual evacuation of all persons underground to the surface in ten minutes or less through routes that will not expose persons to heat, smoke, or toxic fumes in the event of a fire.

(b) If the destruction of any bulkhead on an inactive level would allow fire contaminants to reach an escapeway, that bulkhead shall be constructed and maintained to provide at least the same protection as required for control doors under Table C-3.

TABLE C-3—CONTROL DOOR CONSTRUCTION

Location	Minimum required construction
At least 50 feet from: timbered areas, exposed combustible rock, and any other combustible material ¹	Control door that meets the requirements for a ventilation door in accordance with 30 CFR 57.8531.
Within 50 feet but no closer than 20 feet of: timbered areas, exposed combustible rock, or other combustible material ¹ Within 20 feet of: any timbered areas or combustible rock within the 20 foot distance are coated with one inch of shotcrete, one-half inch of gunite, or other material with equivalent fire protection characteristics and no other combustible material ¹ is within that distance	Control door that serves as a barrier to the effects of fire and air leakage. The control door shall provide protection at least equivalent to a door constructed of no less than one-quarter inch of plate steel with channel or angle-iron reinforcement to minimize warpage. The framework assembly of the door and the surrounding bulkhead, if any, shall be at least equivalent to the door in fire and air-leakage resistance, and in physical strength.
Within 20 feet of: timbered areas, exposed combustible rock, or other combustible material ¹	Control door that serves as a barrier to fire, the effects of fire, and air-leakage. The door shall provide protection at least equivalent to a door constructed of two layers of wood, each a minimum of three-quarters of an inch in thickness. The wood grain of one layer shall be perpendicular to the wood grain of the other layer. The wood construction shall be covered on all sides and edges with no less than twenty-four gauge sheet steel. The framework assembly of the door and the surrounding bulkhead, if any, shall be at least equivalent to the door in fire and air-leakage resistance, and in physical strength. Roll-down steel doors with a fire-resistance rating of 1½ hours or greater, but without an insulation core, are acceptable if an automatic sprinkler or deluge system is installed that provides even coverage of the door on both sides.

¹ In this table, "combustible material" does not refer to installed wiring or track support.

[50 FR 4082, Jan. 29, 1985; 50 FR 20100, May 14, 1985]

§ 57.4761 Underground shops.

To confine or prevent the spread of toxic gases from a fire originating in an underground shop where maintenance work is routinely done on mobile equipment, one of the following measures shall be taken: use of control doors or bulkheads, routing of the mine shop air directly to an exhaust system, reversal of mechanical ventilation, or use of an automatic fire suppression system in conjunction with an alternate escape route. The alternative used shall at all times provide at least the same degree of safety as control doors or bulkheads.

(a) *Control doors or bulkheads.* If used as an alternative, control doors or bulkheads shall meet the following requirements:

(1) Each control door or bulkhead shall be constructed to serve as a barrier to fire, the effects of fire, and air leakage at each opening to the shop.

(2) Each control door shall be—

(i) Constructed so that, once closed, it will not reopen as a result of a differential in air pressure;

(ii) Constructed so that it can be opened from either side by one person or be provided with a personnel door that can be opened from either side;

(iii) Clear of obstructions; and

(iv) Provided with a means of remote or automatic closure unless a person specifically designated to close the door in the event of a fire can reach the door within three minutes.

(3) If located 20 feet or more from exposed timber or other combustible material, the control doors or bulkheads

shall provide protection at least equivalent to a door constructed of no less than one-quarter inch of plate steel with channel or angle-iron reinforcement to minimize warpage. The framework assembly of the door and the surrounding bulkhead, if any, shall be at least equivalent to the door in fire and air-leakage resistance, and in physical strength.

(4) If located less than 20 feet from exposed timber or other combustibles, the control door or bulkhead shall provide protection at least equivalent to a door constructed of two layers of wood, each a minimum of three-quarters of an inch in thickness. The wood-grain of one layer shall be perpendicular to the wood-grain of the other layer. The wood construction shall be covered on all sides and edges with no less than 24-gauge sheet steel. The framework assembly of the door and the surrounding bulkhead, if any, shall be at least equivalent to the door in fire and air-leakage resistance, and in physical strength. Roll-down steel doors with a fire-resistance rating of 1½ hours or greater, but without an insulation core, are acceptable provided that an automatic sprinkler or deluge system is installed that provides even coverage of the door on both sides.

(b) *Routing air to exhaust system.* If used as an alternative, routing the mine shop exhaust air directly to an exhaust system shall be done so that no person would be exposed to toxic gases in the event of a shop fire.

(c) *Mechanical ventilation reversal.* If used as an alternative, reversal of mechanical ventilation shall—

(1) Be accomplished by a main fan. If the main fan is located underground:

(i) The cable or conductors supplying power to the fan shall be routed through areas free of fire hazards; or

(ii) The main fan shall be equipped with a second, independent power cable or set of conductors from the surface. The power cable or conductors shall be located so that an underground fire disrupting power in one cable or set of conductors will not affect the other; or

(iii) A second fan capable of accomplishing ventilation reversal shall be available for use in the event of failure of the main fan;

(2) Provide rapid air reversal that allows persons underground time to exit in fresh air by the second escapeway or find a place of refuge; and

(3) Be done according to predetermined conditions and procedures.

(d) *Automatic fire suppression system and escape route.* If used as an alternative, the automatic fire suppression system and alternate escape route shall meet the following requirements:

(1) The suppression system shall be—

(i) Located in the shop area;

(ii) The appropriate size and type for the particular fire hazards involved; and

(iii) Inspected at weekly intervals and properly maintained.

(2) The escape route shall bypass the shop area so that the route will not be affected by a fire in the shop area.

APPENDIX I TO SUBPART C—NATIONAL CONSENSUS STANDARDS

Mine operators seeking further information in the area of fire prevention and control may consult the following national consensus standards.

MSHA standard	National consensus standard
§§ 57.4200, 57.4201, 57.4261, and 57.4262.	NFPA No. 10—Portable Fire Extinguisher. NFPA No. 11—Low Expansion Foam and Combined Agent Systems. NFPA No. 11A—High Expansion Foam Systems. NFPA No. 12—Carbon Dioxide Extinguishing Systems. NFPA No. 12A—Halon 1301 Extinguishing Systems. NFPA No. 13—Water Sprinkler Systems. NFPA No. 14—Standpipe and Hose Systems. NFPA No. 15—Water Spray Fixed Systems. NFPA No. 16—Foam Water Spray Systems. NFPA No. 17—Dry-Chemical Extinguishing Systems. NFPA No. 121—Mobile Surface Mining Equipment. NFPA No. 291—Testing and Marking Hydrants. NFPA No. 1962—Care, Use, and Maintenance of Fire Hose, Connections, and Nozzles.
§ 57.4202	NFPA No. 14—Standpipe and Hose Systems. NFPA No. 291—Testing and Marking Hydrants.
§ 57.4203	NFPA No. 10—Portable Fire Extinguishers.
§ 57.4230	NFPA No. 10—Portable Fire Extinguishers. NFPA No. 121—Mobile Surface Mining Equipment.
§ 57.4260	NFPA No. 10—Portable Fire Extinguishers.
§ 57.4261	NFPA No. 14—Standpipe and Hose Systems.
§ 57.4533	NFPA Fire Protection Handbook.

§ 57.5001

MSHA standard	National consensus standard
§ 57.4560	ASTM E-162—Surface Flammability of Materials Using a Radiant Heat Energy Source.

Subpart D—Air Quality, Radiation, and Physical Agents

AIR QUALITY—SURFACE AND UNDERGROUND

§ 57.5001 Exposure limits for airborne contaminants.

Except as permitted by § 57.5005—

(a) Except as provided in paragraph (b), the exposure to airborne contaminants shall not exceed, on the basis of a time weighted average, the threshold limit values adopted by the American Conference of Governmental Industrial Hygienists, as set forth and explained in the 1973 edition of the Conference's publication, entitled "TLV's Threshold Limit Values for Chemical Substances in Workroom Air Adopted by ACGIH for 1973," pages 1 through 54, which are hereby incorporated by reference and made a part hereof. This publication may be obtained from the American Conference of Governmental Industrial Hygienists by writing to the Secretary-Treasurer, P.O. Box 1937, Cincinnati, Ohio 45201, or may be examined in any Metal and Nonmetal Mine Safety and Health District Office of the Mine Safety and Health Administration. Excursions above the listed thresholds shall not be of a greater magnitude than is characterized as permissible by the Conference.

(b) The 8-hour time-weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 2 fibers per milliliter greater than 5 microns in length, as determined by the membrane filter method at 400-450 magnification (4 millimeter objective) phase contrast illumination. No employees shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers longer than 5 micrometers, per milliliter of air, as determined by the membrane filter methods over a minimum sampling time of 15 minutes. "Asbestos" is a generic term for a number of hydrated silicates that, when crushed or processed, separate into flexible fibers made up of fibrils. Although there

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are many asbestos minerals, the term "asbestos" as used herein is limited to the following minerals: chrysotile, amosite, crocidolite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

(c) Employees shall be withdrawn from areas where there is present an airborne contaminant given a "C" designation by the Conference and the concentration exceeds the threshold limit value listed for that contaminant.

[50 FR 4082, Jan. 29, 1985, as amended at 60 FR 35695, July 11, 1995]

§ 57.5002 Exposure monitoring.

Dust, gas, mist, and fume surveys shall be conducted as frequently as necessary to determine the adequacy of control measures.

§ 57.5005 Control of exposure to airborne contaminants.

Control of employee exposure to harmful airborne contaminants shall be, insofar as feasible, by prevention of contamination, removal by exhaust ventilation, or by dilution with uncontaminated air. However, where accepted engineering control measures have not been developed or when necessary by the nature of work involved (for example, while establishing controls or occasional entry into hazardous atmospheres to perform maintenance or investigation), employees may work for reasonable periods of time in concentrations of airborne contaminants exceeding permissible levels if they are protected by appropriate respiratory protective equipment. Whenever respiratory protective equipment is used a program for selection, maintenance, training, fitting, supervision, cleaning, and use shall meet the following minimum requirements:

(a) Respirators approved by NIOSH under 42 CFR part 84 which are applicable and suitable for the purpose intended shall be furnished and miners shall use the protective equipment in accordance with training and instruction.

(b) A respirator program consistent with the requirements of ANSI Z88.2-1969, published by the American National Standards Institute and entitled